App. No. 09/975525
Office Action Dated September 26, 2003

Amendments to the Claims:

This listing of claims will replace all prior versions and listing of claims in the application.

Claims 7, 8, 11, 13, 15, 16 and 17 are amended.

Claims 1-6, 9, 10, 14 and 18 are canceled without prejudice or disclaimer.

Listing of Claims:

1-6 (Canceled)

7. (Currently Amended) A magneto-optical recording medium comprising a substrate, and a multilayer film formed on the substrate, the multilayer film comprising a first magnetic layer, a second magnetic layer, and a third magnetic layer, the second magnetic layer being interposed between the first and third magnetic layers and having a Curie temperature T_{C2} that is lower than a Curie temperature T_{C1} of the first magnetic layer and a Curie temperature T_{C3} of the third magnetic layer, the third magnetic layer being a perpendicular magnetization film,

wherein in at least a part of a temperature range lower than the Curie temperature T_{C2}, the first magnetic layer is exchange-coupled with the second magnetic layer so as to be perpendicularly magnetized, and a magnetization of the third magnetic layer is transferred to the first magnetic layer via the second magnetic layer due to the exchange coupling,

wherein the second magnetic layer is in an in-plane magnetization state at room temperature, and makes transition to a perpendicular magnetization state in a temperature range

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from a critical temperature T_{CR} that is higher than room temperature to the Curie temperature T_{C2},

~~The magneto-optical recording medium according to claim 1,~~ wherein the second magnetic layer contains an alloy expressed by a composition formula given as:

$$(Gd_xFe_{1-x})_{1-y}M_y ,$$

where M represents at least one selected from Cr, Si, and Al, x represents a numerical value of not less than 0.15 and not more than 0.40, and y represents a numerical value of not less than 0 and not more than 0.30.

8. (Currently Amended) A magneto-optical recording medium comprising a substrate, and a multilayer film formed on the substrate, the multilayer film comprising a first magnetic layer, a second magnetic layer, and a third magnetic layer, the second magnetic layer being interposed between the first and third magnetic layers and having a Curie temperature T_{C2} that is lower than a Curie temperature T_{C1} of the first magnetic layer and a Curie temperature T_{C3} of the third magnetic layer, the third magnetic layer being a perpendicular magnetization film,

wherein in at least a part of a temperature range lower than the Curie temperature T_{C2}, the first magnetic layer is exchange-coupled with the second magnetic layer so as to be perpendicularly magnetized, and a magnetization of the third magnetic layer is transferred to the first magnetic layer via the second magnetic layer due to the exchange coupling.

wherein the second magnetic layer is in an in-plane magnetization state at room temperature, and makes transition to a perpendicular magnetization state in a temperature range from a critical temperature T_{CR} that is higher than room temperature to the Curie temperature T_{C2}.

~~The magneto-optical recording medium according to claim 1,~~ wherein the second magnetic layer contains an alloy expressed by a composition formula given as:

$$(Tb_xFe_{1-x})_{1-y}M_y,$$

where M represents at least one selected from Cr, Si, and Al, x represents a numerical value of not less than 0.15 and not more than 0.40, and y represents a numerical value of not less than 0 and not more than 0.30.

9-10 (Canceled)

11. (Currently Amended) A magneto-optical recording medium comprising a substrate, and a multilayer film formed on the substrate, the multilayer film comprising a first magnetic layer, a second magnetic layer, and a third magnetic layer, the second magnetic layer being interposed between the first and third magnetic layers and having a Curie temperature T_{C2} that is lower than a Curie temperature T_{C1} of the first magnetic layer and a Curie temperature T_{C3} of the third magnetic layer, the third magnetic layer being a perpendicular magnetization film.

wherein in at least a part of a temperature range lower than the Curie temperature T_{C2}, the first magnetic layer is exchange-coupled with the second magnetic layer so as to be perpendicularly magnetized, and a magnetization of the third magnetic layer is transferred to the first magnetic layer via the second magnetic layer due to the exchange coupling,

wherein the second magnetic layer is in an in-plane magnetization state at room temperature, and makes transition to a perpendicular magnetization state in a temperature range from a critical temperature T_{CR} that is higher than room temperature to the Curie temperature T_{C2}.

~~The magneto-optical recording medium according to claim 1,~~ wherein a non-magnetic layer is provided between the second and third magnetic layers, and the second and third magnetic layers are magnetostatically coupled with each other in at least a part of a region at a temperature lower than the Curie temperature T_{C2}.

12. (Original) The magneto-optical recoding medium according to claim 11, wherein the non-magnetic layer has a thickness of not less than 1 nm and not more than 10 nm.

13. (Currently Amended) A magneto-optical recording medium comprising a substrate, and a multilayer film formed on the substrate, the multilayer film comprising a first magnetic layer, a second magnetic layer, and a third magnetic layer, the second magnetic layer being interposed between the first and third magnetic layers and having a Curie temperature T_{C2} that is lower than

a Curie temperature T_{C1} of the first magnetic layer and a Curie temperature T_{C3} of the third magnetic layer, the third magnetic layer being a perpendicular magnetization film,

wherein in at least a part of a temperature range lower than the Curie temperature T_{C2}, the first magnetic layer is exchange-coupled with the second magnetic layer so as to be perpendicularly magnetized, and a magnetization of the third magnetic layer is transferred to the first magnetic layer via the second magnetic layer due to the exchange coupling,

wherein the second magnetic layer is in an in-plane magnetization state at room temperature, and makes transition to a perpendicular magnetization state in a temperature range from a critical temperature T_{CR} that is higher than room temperature to the Curie temperature T_{C2},

~~The magneto-optical recording medium according to claim 1,~~ wherein the first magnetic layer is in an in-plane magnetization state at room temperature.

14. (Canceled)

15. (Currently Amended) A magneto-optical recording medium comprising a substrate, and a multilayer film formed on the substrate, the multilayer film comprising a first magnetic layer, a second magnetic layer, and a third magnetic layer, the second magnetic layer being interposed between the first and third magnetic layers and having a Curie temperature T_{C2} that is lower than

a Curie temperature T_{C1} of the first magnetic layer and a Curie temperature T_{C3} of the third magnetic layer, the third magnetic layer being a perpendicular magnetization film,

wherein in at least a part of a temperature range lower than the Curie temperature T_{C2}, the first magnetic layer is exchange-coupled with the second magnetic layer so as to be perpendicularly magnetized, and a magnetization of the third magnetic layer is transferred to the first magnetic layer via the second magnetic layer due to the exchange coupling,

wherein the second magnetic layer is in an in-plane magnetization state at room temperature, and makes transition to a perpendicular magnetization state in a temperature range from a critical temperature T_{CR} that is higher than room temperature to the Curie temperature T_{C2}.

~~The magneto-optical recording medium according to claim 1,~~ wherein the first magnetic layer is made of not less than two magnetic films.

16. (Currently Amended) A magneto-optical recording medium comprising a substrate, and a multilayer film formed on the substrate, the multilayer film comprising a first magnetic layer, a second magnetic layer, and a third magnetic layer, the second magnetic layer being interposed between the first and third magnetic layers and having a Curie temperature T_{C2} that is lower than a Curie temperature T_{C1} of the first magnetic layer and a Curie temperature T_{C3} of the third magnetic layer, the third magnetic layer being a perpendicular magnetization film,

wherein in at least a part of a temperature range lower than the Curie temperature T_{C2}, the first magnetic layer is exchange-coupled with the second magnetic layer so as to be perpendicularly magnetized, and a magnetization of the third magnetic layer is transferred to the first magnetic layer via the second magnetic layer due to the exchange coupling,

wherein the second magnetic layer is in an in-plane magnetization state at room temperature, and makes transition to a perpendicular magnetization state in a temperature range from a critical temperature T_{CR} that is higher than room temperature to the Curie temperature T_{C2},

wherein the first magnetic layer is made of not less than two magnetic films,

~~The magneto-optical recording medium according to claim 15,~~ wherein the first magnetic layer includes a magnetic film A, and a magnetic film B having a Curie temperature higher than a Curie temperature of the magnetic film A, which are provided in the stated order from the second magnetic layer side.

17. (Currently Amended) A magneto-optical recording medium comprising a substrate, and a multilayer film formed on the substrate, the multilayer film comprising a first magnetic layer, a second magnetic layer, and a third magnetic layer, the second magnetic layer being interposed between the first and third magnetic layers and having a Curie temperature T_{C2} that is lower than a Curie temperature T_{C1} of the first magnetic layer and a Curie temperature T_{C3} of the third magnetic layer, the third magnetic layer being a perpendicular magnetization film,

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wherein in at least a part of a temperature range lower than the Curie temperature T_{C2}, the first magnetic layer is exchange-coupled with the second magnetic layer so as to be perpendicularly magnetized, and a magnetization of the third magnetic layer is transferred to the first magnetic layer via the second magnetic layer due to the exchange coupling,

wherein the second magnetic layer is in an in-plane magnetization state at room temperature, and makes transition to a perpendicular magnetization state in a temperature range from a critical temperature T_{CR} that is higher than room temperature to the Curie temperature T_{C2}.

~~The magneto-optical recording medium according to claim 1,~~ wherein a fourth magnetic layer having a Curie temperature T_{C4} that is higher than the Curie temperature T_{C2} and the Curie temperature T_{C1} is provided between the first and second magnetic layers.

18. (Canceled)